

Remarks:

These remarks are responsive to the Office action dated September 21, 2007. Prior to entry of this response, claims 16-18, 29-31, 33-35, and 52-64 were pending in the application. By way of this response, claims 16, 29, 52, 55, 58, and 60 are amended and claim 17 is cancelled. Applicants respectfully request reconsideration of the application and allowance of the pending claims.

Rejections under 35 U.S.C. § 112

Claims 16-18, 29-31, 33-35, 52-57, and 60-64 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Applicants respectfully traverse these rejections with regards to the rejections of claims 16, 18, 29-31, 33-35, 52-54, 56, 57, and 60-64.

Referring to claims 16 and 52, the Office action asserts that:

Newly amended claims 16 and 52, the amended phrases are new matter, because the phrases "with at least one cylinder deactivated" and "...said first number of active valves is greater than said second number of active valves" do not appear to be described in the original specification in a way to reasonably explain to one skilled in the art.

Applicants respectfully disagree with this assertion. However, Applicants have amended claims 16 and 52 to further clarify the recited elements for purposes of facilitating prosecution of the present application.

The phrase "with at least one cylinder deactivated" as previously presented is sufficiently supported for the purposes of §112 by at least the description at page 1, line 30 which recites:

The controller causes at least one of the plurality of cylinders to operate in a cylinder deactivation mode in which the intake stroke, combustion stroke, and exhaust stroke are inhibited.

Second, the phrase “said first number of active valves is greater than said second number of active valves” is supported by both the drawings and the specification. Note that the first number of active valves relates to the claimed first mode which includes a lesser number of deactivated cylinders (i.e. greater number of activated cylinders than the second mode. For example, at page 33, line 10 the specification recites:

In one example, at least the following two degrees of freedom can be used to regulate torque capacity of an engine:

- (1) *the number of cylinders carrying out combustion; and*
- (2) *the number of valves operating in each cylinders*

FIG. 11 shows a cylinder and valve mode matrix illustrating some examples of the different modes that can be performed by the engine. FIG. 11 is reproduced below for convenience.

		COLUMN 0		COLUMN 3	
V2	1	1	1	1	ROW 3
12-STROKE	1	1	1	1	
V4	1	1	1	1	
V8	1	1	1	1	ROW 0
	DIDE	DIAE	AIDE	AIAE	

DECREASING TORQUE →

FIG - 11

As shown in FIG. 11, Applicants have provided several examples where a first number of active valves is greater than a second number of active valves.

As a first example, compare cell (1,1) which teaches a V4 mode with 3 active valves per active cylinder with cell (3,3) which teaches a V2 mode with 2 active valves per active cylinder. As a second example, compare cell (0,0) which teaches a V8 mode with 4 active valves per active cylinder with cells (2,1) or (3,1), which teach a V4 mode with 3 or 2 active valves per active cylinder, respectively. Therefore, as demonstrated by at least the mode matrix of FIG. 11 and the accompanying description, the phrase "said first number of active valves is greater than said second number of active valves" in the context of claims 16 and 52, is fully supported for the purposes of §112.

Regarding claim 29, the Office action asserts that:

Claim 29 includes an amended portion that states "...electrically actuated valve operating condition" which does not appear to be described in the original specification.

Applicants respectfully disagree with this assertion. However, Applicants have amended claim 29 to correct for antecedent basis and to further clarify that the active cylinders are cylinders that are carrying out combustion. As supported by claim 29 as originally filed, the specification teaches that a valve can be electrically actuated (e.g. see description of valves 52 and 54, and page 67, line 4).

Additionally, claim 29 as originally filed recited in part: "determining an operation condition of at least one of said electrically actuated valves". The specification at page 32, line 31, supports this limitation by teaching that:

Also, the method of Figure 10 may be configured to determine operating conditions of a valve, valve actuator, engine, chassis, electrical system, catalyst system, or other vehicle system. The before-mentioned operating conditions may be used to determine a number of active cylinders, number of active valves, valve patterns,

Furthermore, claim 29 as originally filed also recited in part: "selecting a number of cylinders to operate based on said electrically actuated valve operating condition". Therefore, the electrically actuated valve operating condition term is also clearly supported, for the purposes of section §112, by at least the language of the very same claim.

Regarding claim 54, the Office action asserts that:

Claim 54 includes an amended portion that states "...said second mode..." which does not appear to be described in the original specification.

Applicants again disagree with this assertion. First, claim 53 from which claim 54 depends and as originally filed with the present application includes the "second mode". Additionally, as shown in FIG. 11, the engine can operate alternately between different valves active per cylinder while still operating with said second number of valves per cylinder, which is less than the first number. For example, compare cells (0,1) which teaches a V4 mode with 4 active valves per cylinder with cell (1,1) which teaches a V4 mode with 3 active valves per cylinder. Therefore, claim 54 is sufficiently supported for the purposes of §112.

Regarding claim 55, the Office action asserts that:

Claim 55 includes an amended portion that states "...each electrically actuated intake valve..." which does not appear to be described in the original specification.

Applicants respectfully disagree with this assertion. However, Applicants have amended claim 55 to remove the limitations associated with the common intake manifold. As described throughout the specification, an intake valve such as valve 52 shown in FIG. 1 can be electrically actuated. Also, with reference to FIG. 21A, the specification recites:

Referring now to Figure 21A, an alternative configuration is shown with electrically actuated intake valves,

Therefore, the specification and drawings have sufficiently described an electrically actuated intake valve for the purposes of §112.

Regarding claim 60, the Office action asserts that various claimed elements and limitations do not appear to be described in the original specification. Applicants again disagree with this assertion. First, claim 60 is at least supported by the mode matrix shown in FIG. 11. For example, compare cell (0,0) which teaches a V8 mode with a first number of exhaust valves operating (e.g. 2 per cylinder) to cell (2,1) which teaches a V4 mode with a second number exhaust valves operating (e.g. 1 per cylinder). Therefore, at least FIG. 11 and accompanying text sufficiently describes the rejected limitation for the purposes of §112.

Rejections under 35 U.S.C. § 102

Claims 16-18 and 52-59 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent Number 6,382,193 (Boyer et al.). Applicants respectfully traverse this rejection.

Claims 16 and 52 as previously presented recite in part:

where said first number of cylinders is less than said second number of cylinders, and said first number of active valves is greater than said second number of active valves.

In contrast, Boyer et al. does not appear to change the number of active valves in the active cylinders (i.e. those cylinders carrying out combustion). In the example depicted in FIG. 2 of Boyer, valves 18 of the active cylinders continue to operate in all modes. In other words, both intake valves labeled 18 are operated in each cylinder for the VDE mode, Boosted VDE mode, and Full Cylinder mode.

Applicants have amended claims 16 and 52 to further clarify that the first number and second number of active valves refers to the number of active valves of each of the cylinders carrying out combustion (i.e. active cylinders) for the first and second modes, respectively. Support for this amendment includes at least FIG. 11 and the accompanying text. For example, compare cell (0,0)

which teaches a V-8 mode with 4 active valves per active cylinder with cell (3,1), which teaches a V-4 mode with only two active valves per active cylinder.

As Boyer et al. does not teach each and every limitation of claims 16 and 52, Applicants request that the rejection of these claims and all dependent claims be withdrawn for at least this reason.

With regards to claim 18, Boyer et al. does not teach the approach of changing the pattern of the active valves of the active cylinders (i.e. those carrying out combustion). In contrast, Boyer et al. teaches operating each of valves 18 for each active cylinder, while changing the patterns in the deactivated (i.e. none combusting) cylinders to control boosting via valve 20.

With regards to claim 54, Boyer et al. does not teach the approach of operating alternately between different valves per active cylinder, but instead teaches adjusting valve 20 which is in an inactive cylinder, for example. Thus, Applicants respectfully request that the rejection of claim 54 and all dependent claims be withdrawn for at least this reason.

With regards to claim 55, Boyer et al. does not appear to teach a first configuration of electrically actuated intake valves operating in active cylinders to carry out combustion in the active cylinders and a second configuration of electrically actuated intake valves operating in active cylinders to carry out combustion in the active cylinders. In contrast, Boyer et al. teaches the same valve configuration in cylinders carrying out combustion across all modes of operation, including VDE, Boosted VDE, and Full Cylinder modes. As such, Applicants respectfully request that the rejection of claim 55 and all claims depending from claim 55 be withdrawn for at least this reason.

With regards to claim 60, Boyer et al. does not appear to teach operating an engine in a first mode with a first number and pattern of active exhaust valves operating per each active cylinder to carry out combustion in the active cylinders; and operating the engine in a second mode with a number of cylinders deactivated, and a second number and pattern of active exhaust valves per each active cylinder operating to carry out combustion. In contrast, Boyer et al. appears to teach operating the same number of exhaust valves per each active

cylinder that is carrying out combustion. For example, FIGS. 2 and 3 of Boyer et al. depict only a single exhaust valve operating for each active cylinder. As such, Applicants request that the rejection of claim 60 and all dependent claims be withdrawn for at least this reason.

Rejections under 35 U.S.C. § 103

Claims 29-31, and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boyer et al. in view of U.S. Patent Number 6,401,684 (Hori). Applicants respectfully traverse this rejection.

Claim 29 recites in part:

determining a number of electrically actuated valves to operate in a selected cylinder carrying out combustion based on said number of cylinders and based on said electrically actuated valve operating condition

Boyer et al. does not appear to teach an approach of determining a number of electrically actuated valves to operate in a cylinder carrying out combustion. In contrast, Boyer et al. teaches operating both intake valves 18 for each of the cylinders carrying out combustion. Therefore, Boyer et al. does not determine the number of electrically actuated valves to operate in a cylinder carrying out combustion based on either the number of cylinders carrying out combustion or the electrically actuated valve operating condition.

The reference of Hori et al. does not appear to cure this deficiency in Boyer et al., since Hori et al. does not determine the number of electrically actuated valves to operate in a cylinder carrying out combustion based on the number of cylinders carrying out combustion. As such, Applicants respectfully request that the rejection of claims 29 and all dependent claims be withdrawn for at least this reason.

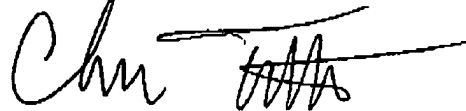
Conclusion

Applicants believe that this application is now in condition for allowance, in view of the above amendments and remarks. Accordingly, Applicants respectfully request that the Examiner issue a Notice of Allowability covering the pending claims. If the Examiner has any questions, or if a telephone interview would in any way advance prosecution of the application, please contact the undersigned attorney of record.

Please charge any cost incurred in the filing of this Response, along with any other costs, to Deposit Account No. 06-1510.

Respectfully submitted,

ALLEMAN HALL MCCOY RUSSELL & TUTTLE LLP



Christopher S. Tuttle
Registration No. 41,357
Customer No. 36865
Attorney/Agent for Applicants/Assignee
806 S.W. Broadway, Suite 600
Portland, Oregon 97205
Telephone: (503) 459-4141
Facsimile: (503) 459-4142